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SUPPLEMENT 1.0
RPP-WTP COMPLIANCE WITH UNIFORM BUILDING CODE
SEISMIC DESIGN REQUIREMENTS

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Introduction

This report outlines how the seismic design requirements specified for the WTP facilities will meet, as a minimum, all the requirements of the 1997 Uniform Building Code.

Compliance with the Uniform Building Code

Design of all structures, systems and components (SSC's) for the WTP facility will meet, as a minimum, the design requirements of the Uniform Building Code and thus satisfy the requirements of WAC 173-303-806(4)(a)(xi).

Two approaches are allowed per UBC, the design procedures prescribed in Chapter 16 and alternate procedures per Section 1629.10. The procedures to be utilized for each SSC will be set after the SSC is categorized.

Each facility is evaluated to determine both the hazards associated with internal events caused by the process systems and hazards associated with the events external to the facility, including seismic events. The hazard assessment process will identify SSC's which have importance to safety functions. Once these SSC's are identified, they are categorized based on the necessity for them to function during or following a seismic event.

Seismic Categorization

The primary categorization of SSC's is for Natural Phenomena Hazards, the most significant being seismic events. The seismic categories used for designing WTP facilities are defined by the requirements of the SSC to perform its safety function during a seismic event.

Seismic Category I (SC-I)

SSC's important to safety, which has a safety function.

Seismic Category II (SC-II)

SSC's important to safety, whose failure during a seismic event could prevent a Seismic Category I SSC from performing its safety function.

Seismic Category III (SC-III)

- a). SSC's important to safety, but without a seismic safety function.
- b). SSC's not important to safety, but which has significant inventory of radioactive or hazardous material.

Seismic Category IV (SC-IV)

SSC's not important to safety and without an inventory of radioactive or hazardous material, but requiring seismic protection.

Seismic Design Criteria

The WTP Project has evaluated standards for seismic design, which met the minimum requirements of UBC and selected Department of Energy standard DOE-STD-1020, for evaluation of natural phenomena hazards, including specifically for seismic design. The following project documents have been developed for selection of appropriate seismic design basis events and design criteria for design of SSC's.

- “TWRS-P Facility Design Earthquake-Peak Ground Acceleration, Seismic Response Spectra, and Seismic Design Approach”, RPT-W375-RU00002. This report documents and summarizes the project approach to selection of seismic standards and the specific seismic standard selection. The report also applies that standard to establish the peak design basis peak ground acceleration value, and associated seismic response, spectra that will be used to develop the design response spectra.
- “Applicability of DOE Documents to the Design of TWRS-P Facility for Natural Phenomena Hazards”, RPP-W375-RU00003. This report documents a review by the design team to identify the DOE standards that apply to the design of the WTP (formerly TWRS-P).
- “Validation of the Geomatrix Hanford Seismic Report for Use on the TWRS Privatization Project”, RPT-W375-RU00004. This report documents a review by the project of an extensive site-specific report that considers the seismology and geological conditions on the Hanford Site for applicability to the WTP site. The report concluded that the Geomatrix report adequately assesses the seismic hazards and would be used to select a site-specific seismic design response spectra.
- “Seismic Analysis and Design Approach”, RPT-W375-RU00005. This report identifies the specific requirements for seismic design of SSC's. Requirements for evaluation of seismic loads and applicable design codes to adequately design SSC's to resist these loads is contained in this report.
- “Final Report-Geotechnical Investigation, WTP”, by Shannon & Wilson, Inc., H-1616-51. This report was prepared to evaluate the site-specific soil conditions and provide design limitations. The report also identified the appropriate soil type to be used for design of seismic loads in accordance with the Uniform Building Code.

Design Requirements

The seismic design requirements for Seismic Category IV and Seismic Category III, SSC's follow the requirements of the UBC. In accordance with UBC, Figure 16-2, the USGS seismic hazards survey map, the WTP site is designated as seismic zone 2B. Since SC-IV SSC's do not contain significant radioactive or hazardous materials, the Importance Factor I used in design is 1.0. SC-III SSC's contain radioactive and hazardous materials and will be designed with an Importance Factor of 1.25.

The WTP project has selected alternative methods for evaluation of seismic loads and design of SSC's, within the provision of the UBC. These alternative evaluation procedures applied to SC-I and SC-II SSC's are the following.

- ASCE 4, "Seismic Analysis of Safety-Related Nuclear Structures"
- Nuclear Regulatory Commission Guide 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis".
- Selected sections of the Nuclear Regulatory Commission regulations for seismic design contained in NUREG-0800, "Standard Review Plan".

The UBC permits the use of alternative lateral-force procedures, using rational analyses based on well-established principals used for design of facilities with more significant hazardous consequences similar to SC-I and SC-II WTP facilities.

Conclusion

In conclusion, the seismic design requirements for the WTP facilities meet the provisions of or alternative methods permitted by the UBC. The requirements for seismic design of Seismic Category III and IV structures, systems and components are achieved by direct application of the UBC. The requirements for seismic design of Seismic Category I and II structures, systems and components are achieved through well-established alternative methods. Structures, systems and components designed in accordance with the requirements established for the WTP project will adequately resist the maximum horizontal and vertical acceleration ground motions associated with the seismic zone 2B or site-specific seismic response spectra, as permitted by the UBC.

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